FOOD STANDARDS Australia New Zealand
Te Mana Kounga Kai – Ahitereiria me Aotearoa

Supporting document 2

Chemical guidelines/standards for drinking water.

Application A1043

World Health Organization Limits for Packaged Water

Executive summary

FSANZ has tabulated the various chemical substances and their respective maximum levels in a number of drinking water guidelines and standards. These guidelines or standards include:

- Australia New Zealand Food Standards Code, Standard 2.6.2, Table to clause 2(2).
- WHO Guidelines for Drinking-water Quality, 2011 (WHO guidelines), Table A3.3 *Guideline values for chemicals that are of health significance in drinking-water*. The chemical limits in these guidelines are also used by the Codex Standard for Bottled/Packaged Waters (other than natural mineral waters) (CODEX STAN 227-2001).
- Codex Standard for Natural Mineral Waters, 2011 (CODEX STAN 108-1981).
- National Health and Medical Research Council (NHMRC), Australian Drinking Water Guidelines, 2011.
- New Zealand Ministry of Health, Drinking-water Standards for New Zealand, 2005/2008.
- Australasian Bottled Water Institute, Model Code.

All maximum levels have been expressed as mg/L. A Chemical Abstract Service registry number (CAS No.) has been provided where appropriate.

Chemical	CAS No. If applicable	ANZ Food Standards Code Standard 2.6.2 (mg/L)	WHO^ Guidelines for Drinking Water Quality (2011)[a] (mg/L)	CODEX Standard for Natural Mineral Waters (2011) (mg/L)	NHMRC Australian Drinking Water Guidelines (2011) (mg/L)	NZMOH Drinking-water Standards for New Zealand (2005) (mg/L)	ABWI Model Code (mg/L)
Standard or Guideline		Standard	Guideline	Standards	Guideline	Standard	Guideline
Packaged water, natural mineral water of drinking water		Packaged water	Drinking water	Natural Mineral Water	Drinking water	Drinking water	Packaged water
	Chemicals in common with the Code						
Arsenic	7440-38-2	0.05	0.01 (A,T)	0.01 (total As)	0.01	0.01[g]	0.05
Barium	7440-39-3	1.0	0.7	0.7	2	0.07	1.0
Borate/Boron	7440-42-8	30 (as H_3BO_4)	2.4 (as Boron)	5 (as Boron)	4 (as Boron)	1.4	
Cadmium	7440-43-9	0.01	0.003	0.003	0.002	0.004	0.005
Chromium	7440-47-3	0.04 (as Cr (VI))	0.05 (P) (total)	0.05 (total Cr)	0.05 (as Cr(VI))	0.05 (total)[g]	0.05
Copper	7440-50-8	1.0	2	1	2	2	1.0
Cyanide	57-12-5	0.01		0.07	0.08	0.08	
Fluoride	16984-48-8	2.0 (Naturally occurring)	1.5*	Labelling for >1 mg/L & >1.5 mg/L	1.5	1.5[h]	1.0
Lead	7439-92-1	0.05	0.01 (A,T)	0.01	0.01	0.01	0.005
Manganese	7439-96-5	2.0		0.4	0.5	0.4	0.05
Mercury	7439-97-6	0.001	0.006 (inorganic)	0.001	0.001	0.002	0.001
Nitrate	122019-28-7	45	50	50	50	50[i]	10
Nitrite	14797-65-0	0.005	3	0.1	3	3	1.0
Organic matter	NA	3.0 ($KMnO_3$ digested as O_2)					
Selenium	7782-49-2	0.01	0.04 (P)	0.01	0.01	0.01	0.01
Sulphide		0.05 (as H_2S)					
Zinc	7440-66-6	5.0					
	Additional chemical analytes						

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Acephate	30560-19-1				0.008		
Acrylamide	79-06-1		0.0005 [a]		0.0002	0.0005	
Alachlor	15972-60-8		0.02 [a]			0.02	0.002
Aldicarb (sulfoxide & sulfone)	1646-87-3, 1646-88-4		0.01		0.004	0.01	
Aldrin and Dieldrin	309-00-2 60-57-1		0.00003		0.0003	0.00004	
Ametryn	834-12-8				0.07		
Amitraz	33089-61-1				0.009		
Amitrole	61-82-5				0.009		
Anatoxin-a	64285-06-9					0.006 [g]	
Anatoxin-a(s)	103170-78-1					0.001 [g]	
Antimony	7440-36-0		0.02	0.005	0.003	0.02	0.006
Asulam	3337-71-1				0.07		
Atrazine (and its chloro-s-triazine metabolites, WHO)	1912-24-9		0.1		0.02	0.002	0.003
Azinphos-methyl	86-50-0				0.03	0.004 [g]	
Benomyl	17804-35-2				0.09		
Bentazone	25057-89-0				0.4	0.4 [g]	
Benzene	71-43-2		0.01 [a]		0.001	0.01	0.005
Benzo(*a*)pyrene	50-32-8		0.0007 [a]		0.00001	0.0007	0.0002
Beryllium	7440-41-7				0.06	0.004 [g]	
Bioresmethrin	28434-01-7				0.1		
Bromacil	314-40-9				0.4	0.4	
Bromate	7789-38-0 (Na) 7758-01-2 (K)		0.01 [a] (A,T)		0.02	0.01	
Bromodichloro-methane	75-27-4		0.06 [a]			0.06	
Bromoform	75-25-2		0.1			0.1	

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Bromophos-ethyl	4824-78-6				0.01		
Bromoxynil	1689-84-5				0.01		
Captan	133-06-2				0.4		
Carbaryl	63-25-2				0.03		
Carbendazim/ Thiophanate-methyl	10605-21-7 23564-06-9				0.09		
Carbofuran	1563-66-2		0.007		0.01	0.008	0.04
Carbon tetrachloride	56-23-5		0.004		0.003	0.005	0.005
Carbophenothion	786-19-6				0.0005		
Carboxin	5234-68-4				0.3		
Carfentrazone-ethyl	128639-02-1				0.1		
Chlorantraniliprole	500008-45-7				6		
Chlorate	14866-68-3		0.7 (D)			0.8 [g]	
Chlordane	57-47-9 also 12789-03-6		0.0002		0.002	0.0002	0.002
Chlorfenvinphos	470-90-2				0.002		
Chlorine	7782-50-5		5 (C)		5 (4.1 for chloraminated systems)	5	Free <0.1
Chlorine dioxide	10049-04-4				1		
Chlorite	14998-27-7		0.7 (D)		0.8	0.8 [g]	
Chloroacetate (as chloroacetic acid)	79-11-8				0.15		
Chlorobenzene	108-90-7				0.3	0.3 [g]	
Chloroform	67-66-3		0.3			0.2	
2-Chlorophenol	95-57-8				0.3		
Chlorothalonil	1897-45-6				0.05		
Chlorotoluron	15545-48-9		0.03			0.04	
Chloroxuron	1982-47-4				0.01		
Chlorpyrifos	2921-88-2		0.03		0.01	0.04	
Chlorsulfuron	64902-72-3				0.2		

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Clopyralid	1702-17-6				2		
Cyanazine	21725-46-2		0.0006			0.0007	
Cyanogen chloride	506-77-4				0.08	0.08 (as CN)	
Cyfluthrin & beta-cyfluthrin	68359-37-5				0.05		
Cylindrospermopsin	143545-90-8					0.001 [g]	
Cypermethrin isomers	52315-07-8				0.2		
Cyprodinil	121552-61-2				0.09		
Deltamethrin	52918-63-5				0.04		
2,4-D (2,4-dichlorophenoxy acetic acid)	94-75-7		0.03 [b]		0.03	0.04	0.07
2,4-DB (2,4-dichlorophenoxy butyric acid)	94-82-6		0.09 [c]			0.1	
DDT [d] and metabolites	50-29-3, 789-02-6		0.001		0.009	0.001	
Diazinon	333-41-5				0.004	0.01 [g]	
Dicamba	1918-00-9				0.1		
Dichlobenil	1194-65-6				0.01		
Di(2-ethylhexyl)adipate	103-23-1					0.1 [g]	
Di(2-ethylhexyl) phthalate	117-81-7		0.008		0.01	0.009	0.006
Dibromoacetonitrile	3251-43-5		0.07			0.08	
Dibromochloro-methane	124-48-1		0.1			0.15	
1,2-Dibromo-3-chloropropane	96-12-8		0.001 [a]			0.001	0.0002
1,2-Dibromoethane (EDB, ethylene dibromide)	106-93-4		0.0004 [a] (P)		0.001	0.0004 [g]	

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Dichloroacetate	13425-80-4		0.05 [a] (D)		0.1 (dichloroacetic acid)	0.05 (dichloroacetic acid) [g]	
Dichloroacetonitrile	3018-12-0		0.02 (P)			0.02 [g]	
1,2-Dichlorobenzene, (*o*-dichlorobenzene)	95-50-1		1 (C)		1.5	1.5	0.6
1,4-Dichlorobenzene, (*p*-dichlorobenzene)	106-46-7		0.3 (C)		0.04	0.4	0.075
1,2-Dichloroethane	107-06-2		0.03 [a]		0.003	0.03	0.005
1,1-Dichloroethene	75-35-4				0.03	0.03	
1,2-Dichloroethene (1,2-dichloroethylene)	540-59-0		0.05		0.06	0.06	0.075
Dichloromethane (methylene chloride)	75-09-2		0.02		0.004	0.02	0.005
2,4-Dichlorophenol	120-83-2				0.2		
1,2-Dichloropropane (1,2- DCP)	78-87-5		0.04 (P)			0.05 [g]	0.005
1,3-Dichloropropene	542-75-6		0.02 [a]		0.1	0.02	0.001 [j]
Dichlorprop / Dichloroprop-P (2,4-DP; 2-(2,4-dichlorophenoxy) propionoic acid))	120-36-5 15165-67-0		0.1		0.1	0.1	
Dichlorvos	62-73-7				0.005		
Diclofop-methyl	51338-27-3				0.005		
Dicofol	115-32-2				0.004		
Difenzoquat	49866-87-7				0.1		
Diflubenzuron	35367-38-5				0.07		
Dimethoate	60-51-5		0.006		0.007	0.008	
1,4-Dioxane	123-91-1		0.05 [a]				

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Diphenamid	957-51-7				0.3		
Diquat (ion), diquat dibromide	2764-72-9 85-00-7				0.007	0.01 [g]	
Disulfoton	298-04-4				0.004		
Diuron	330-54-1				0.02	0.02 [g]	
2,2-DPA (Dalapon; 2,2 dichloropropionic acid)	75-99-0				0.5		
EDTA (edetic acid)	60-00-4		0.6		0.25	0.7	
Endosulfan	115-29-7				0.02	0.02 [g]	
Endothal	145-73-3				0.1		
Endrin	72-20-8		0.0006			0.001	0.0002
Epichlorohydrin	106-89-8		0.0004 (P)		0.0005[#]	0.0005 [g]	
EPTC (*S*-ethyl dipropyl-(thiocarbamate))	759-94-4				0.3		
Esfenvalerate	66230-04-4				0.03		
Ethion	563-12-2				0.004		
Ethoprophos	13194-48-1				0.001		
Ethylbenzene	100-41-4		0.3 (C)		0.3	0.3	0.7
Etridiazole	2593-15-9				0.1		
Fenamiphos	22224-92-6				0.0005		
Fenarimol	60168-88-9				0.04		
Fenitrothion	122-14-5				0.007		
Fenoprop (Silvex; 2,4,5-TP)	93-72-1		0.009		0.01	0.01	0.01 [j]
Fensulfothion	115-90-2				0.01		
Fenthion	55-38-9				0.007		
Fenvalerate	51630-58-1				0.06		
Fipronil	120068-37-3				0.0007		
Flamprop-methyl	52756-25-9				0.004		
Fluometuron	2164-17-2				0.07		

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Fluoranthene	206-44-0					0.004 [g]	
Flupropanate	22898-01-7				0.009		
Formaldehyde	50-00-0				0.5	1	
Formothion	2540-82-1				0.05		
Fosamine	59682-52-9				0.03		
Glyphosate	1071-83-6				1		
Haloxyfop	69806-34-4				0.001		
Heptachlor	76-44-8				0.0003	0.00004 (and its epoxide) [g]	
Hexachlorobenzene	118-74-1					0.0001 [g]	
Hexachloro-butadiene	87-68-3		0.0006		0.0007	0.0007	0.001 [j]
Hexaflurate	17029-22-0				0.03		
Hexazinone	51235-04-2				0.4	0.4 [g]	
Homoanatoxin-a	142926-86-1					0.002 [g]	
Hydroxyatrazine	2163-68-0		0.2				
Imazapyr	81334-34-1				9		
Iodide	149733-88-0				0.1		
Iprodione	36734-19-7				0.1		
Isoproturon	34123-59-6		0.009			0.01	
Lindane (ɣ-hexachlorocyclo-hexane)	58-89-9		0.002		0.01	0.002	0.0002
Lithium	7439-93-2					1 [g]	
Maldison (Malathion)	121-75-5				0.07	1 [g]	
Mancozeb	8018-01-7				0.009 for ETU (ethylene thiourea = degradant)		
MCPA [e]	94-74-6		0.002		0.04	0.002	
MCPB (4-(2-methyl-4-chlorophenoxy) butyric acid)	94-81-5					0.03	

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Mecoprop (MCPP)	7085-19-0		0.01			0.01	
Metalaxyl	57837-19-1					0.1 [g]	
Metaldehyde	108-62-3				0.02		
Metham	137-42-8				0.001 for MTIC (methylisothiocyanate = degradant)		
Methidathion	950-37-8				0.006		
Methiocarb	2032-65-7				0.007		
Methomyl	16752-77-5				0.02		
Methoxychlor	72-43-5		0.02		0.3	0.02	0.04
Methyl bromide	74-83-9				0.001		
Metiram	9006-42-2				0.009 for ETU (ethylene thiourea = degradant)		
Metolachlor	51218-45-2		0.01		0.3	0.01	
Metribuzin	21087-64-9				0.07	0.07 [g]	
Metsulfuron-methyl	74223-64-6				0.04		
Mevinphos	7786-34-7				0.005		
Microcystin-LR	101043-37-2		0.001 (P) microcystin-LR (free plus cell-bound)		0.0013	0.001	
Molinate	2212-67-1		0.006		0.004	0.007	
Molybdenum	7439-98-7				0.05	0.07	0.001 [j]
Monochloramine	10599-90-3		3		3	3	
Monochloroacetate	140-18-1		0.02			0.02 (as the acid)	
Monocrotophos	6923-22-4				0.002		
Napropamide	15299-99-7				0.4		
Nicarbazin	330-95-0				1		
Nickel	7440-02-0		0.07	0.02	0.02	0.02 [g]	0.1
Nitralin	4726-14-1				0.5		

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Nitrilotriacetic acid (NTA)	139-13-9		0.2		0.2	0.2	
Nitrite, long term	14797-65-0					0.2 [g]	
N-Nitrosodimethyl-amine (NDMA)	62-75-9		0.0001		0.0001		
Nodularin	118399-22-7					0.001 [g]	
Norflurazon	27314-13-2				0.05		
Omethoate	1113-02-6				0.001		
Oryzalin	19044-88-3				0.4	0.4 [g]	
Oxadiazon	19666-30-9					0.2 [g]	
Oxamyl	23135-22-0				0.007		
Paraquat	4685-14-7				0.02		
Parathion (ethyl parathion)	56-38-2				0.02		
Parathion-methyl	298-00-0				0.0007	0.01 [g]	
Pebulate	1114-71-2				0.03		
Pendimethalin	40487-42-1		0.02		0.4	0.02	
Pentachlorophenol	87-86-5		0.009 [a] (P)		0.01	0.009 [g]	0.001
Permethrin	52645-53-1				0.2	0.02 [g]	
2-Phenylphenol	90-43-7					1.4 [g]	
Picloram	1918-02-1				0.3	0.2 [g]	
Piperonyl butoxide	51-03-6				0.6		
Pirimicarb	23103-98-2				0.007		
Pirimiphos-ethyl	23505-41-1				0.0005		
Pirimiphos-methyl	29232-93-7				0.09	0.1 [g]	
Polihexanide	27083-27-8 32289-58-0				0.7		
Primisulfuron methyl	86209-51-0					0.9 [g]	
Procymidone	32809-16-8					0.7 [g]	
Profenofos	41198-08-7				0.0003		
Propachlor	1918-16-7				0.07		
Propanil	709-98-8				0.7	0.02 [g]	

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Propargite	2312-35-8				0.007		
Propazine	139-40-2				0.05	0.07 [g]	
Propiconazole	60207-90-1				0.1		
Propyzamide	23950-58-5				0.07		
Pyrasulfotole	365400-11-9				0.04		
Pyrazophos	13457-18-6				0.02		
Pyridate	55512-33-9					0.1 [g]	
Pyriproxifen	95737-68-1					0.4	
Pyroxsulam	422556-08-9				4		
Quintozene	82-68-8				0.03		
Saxitoxins	35523-89-8					0.003 (as Saxitoxin equivalents)	
Silver	7440-22-4				0.1	0.1	
Simazine	122-34-9		0.002		0.02	0.002	0.004
Sodium dichloroisocyanurate	2893-78-9		40 as cyanuric acid				
Sodium fluoroacetate (1080)	62-74-8					0.0035 [g]	
Spirotetramat	203313-25-1				0.2		
Styrene (vinylbenzene)	100-42-5		0.02 (C)		0.03	0.03	0.1
Sulfate	NA				500		
Sulprofos	35400-43-2				0.01		
2,4,5-T [f]	93-76-5		0.009		0.1	0.01	
Temephos	3383-96-8				0.4		
Terbacil	5902-51-2				0.2	0.04 [g]	
Terbufos	13071-79-9				0.0009		
Terbuthylazine	5915-41-3		0.007		0.01	0.008	
Terbutryn	886-50-0				0.4		
Tetrachloroethene (Tetrachloro-ethylene)	127-18-4		0.04		0.05	0.05	0.005

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Tetrachlorvinphos	22248-79-9				0.1		
Thiobencarb	28249-77-6				0.04		
Thiabendazole	148-79-8					0.4 [g]	
Thiometon	640-15-3				0.004		
Thiophanate	23564-06-9				0.005		
Thiram	137-26-8				0.007		
Toltrazuril	69004-03-1				0.004		
Toluene	108-88-3		0.7 (C)		0.8	0.8	1.0
Triadimefon	43121-43-3				0.09		
Tributyltin oxide	56-35-9				0.001	0.002 [g]	
Trichlorfon	52-68-6				0.007		
Trichloroacetate	76-03-9		0.2		0.1 (as trichloroacetic acid)	0.2 (as trichloroacetic acid)	
Trichloroacet-aldehyde (chloral hydrate)	302-17-0				0.02	0.01 [g]	
Trichlorobenzenes	12002-48-1				0.03 (total)	0.03 (total) [g]	
Trichloroethane	71-55-6 79-00-5					2 [g]	
Trichloroethene (trichloroethylene)	79-01-6		0.02 (P)			0.08 [g]	0.001
Trichlorophenol, 2,4,6-(as speciated phenolics)	25167-82-2		0.2 [a] (C)		0.02	0.2	0.001
Triclopyr	55335-06-3				0.02	0.1 [g]	
Trifluralin	1582-09-8		0.02		0.09	0.03	
Trihalomethanes	See individual entries		The sum of the ratio of the concentration of each to its respective guideline value		0.25	The sum of the ratio of the concentration of each to its respective MAV should not exceed	0.01

Chemical	CAS No. If applicable	ANZ Food Standards Code Standard 2.6.2 (mg/L)	WHO^ Guidelines for Drinking Water Quality (2011)[a] (mg/L)	CODEX Standard for Natural Mineral Waters (2011) (mg/L)	NHMRC Australian Drinking Water Guidelines (2011) (mg/L)	NZMOH Drinking-water Standards for New Zealand (2005) (mg/L)	ABWI Model Code (mg/L)
			should not exceed 1			1	
Uranium	7440-61-1		0.30 (P)		0.0017	0.02 [g]	
Vernolate	1929-77-7				0.04		
Vinyl chloride	75-01-4		0.0003 [a]		0.0003	0.0003	0.002
Xylene	1330-20-7		0.5 (C)		0.6	0.6 (total)	10
Surface active agents				< LOQ			
Pesticides and PCBs				< LOQ			
Mineral oil				< LOQ			
Polynuclear aromatic hydrocarbons				< LOQ			
Total no. of analytes		**17**	**90**	**16**	**212**	**140**	**49**

Information correct as of 10 May 2012

Notes regarding chemical guidelines/standards for drinking water

Explanatory notes

A = provisional guideline value because calculated guideline value is below the achievable quantification level;
C = concentrations of the substance at or below the health-based guideline value may affect the appearance, taste or odour of the water, leading to consumer complaints;
D = provisional guideline value because disinfection is likely to result in the guideline value being exceeded;
P = provisional guideline value because of uncertainties in the health database;
T = provisional guideline value because calculated guideline value is below the level that can be achieved through practical treatment methods, source protection, etc.

[a] For substances that are considered carcinogenic, the guideline value is the concentration in drinking water associated with an upper-bound excess lifetime cancer risk of 10^{-5} (one additional cancer per 100 000 of the population ingesting drinking water containing the substance at the guideline value for 70 years).
[b] 2,4-Dichlororphenoxyacetic acid.
[c] 2,4-Dichlorophenoxybutyric acid.
[d] Dichlorodiphenyltrichloroethane.
[e] 4-(2-Methyl-4-chlorophenoxy)acetic acid.
[f] 2,4,5-Trichlorophenoxyacetic acid.
[g] PMAV: Provisional Maximum Acceptable Value (because it is provisional in the WHO Guidelines (WHO 2004) or WHO has no guideline value but the New Zealand Drinking Water standards have retained a MAV or developed its own).
[h] For oral health reasons the NZ Ministry of Health recommends that the fluoride content for drinking-water in New Zealand be in the range of 0.7 – 1.0 mg/L. This is not a MAV.
[i] Short term exposure. The short term exposure MAVs for nitrate and nitrite have been established to protect against methaemoglobin in bottle-fed infants.
[j] Not strictly part of the ABWI CoP, but a value is included by the testing laboratory (NMI = National Measurement Institute, Australia)

* Fluoride: Volume of water consumed and intake from other sources should be considered when setting national standards.
# The guideline value is below the limit of quantitation. Improved analytical procedures are required for this compound.
^ Chemical limits also used for the Codex Standard for Bottled/Packaged Waters (CODEX STAN 227-2001).

Additional information not shown in table

For the New Zealand Drinking Water Guidelines, MAVs are defined as the maximum acceptable values for inorganic and organic compounds of health significance.
Both the Australian Drinking water Guidelines and the New Zealand Drinking Water Guidelines also contain maximum acceptable values for radiological compounds:

References

World Health Organization's (WHO) Guidelines for Drinking Water Quality 2011. Annex 3 (Chemical Summary Tables). Table A3.3 Guideline values for chemicals that are of health significance in drinking-water. http://www.who.int/water_sanitation_health/publications/2011/dwq_guidelines/en/

NHMRC, NRMMC (2011) *Australian Drinking Water Guidelines Paper 6 National Water Quality Management Strategy*. National Health and Medical Research Council, National Resource Management Ministerial Council, Commonwealth of Australia, Canberra.

Ministry of Health. *Drinking-water Standards for New Zealand 2005*. Wellington: Ministry of Health.
http://www.moh.govt.nz